20. (New) The method, as recited in claim 13, wherein the NH3 has a flow rate, wherein the flow rate of NH3 is from about 100 sccm to about 1000 sccm.

21. (New) The method, as recited in claim 13, wherein the NH3 has a flow rate from about 300 sccm to about 800 sccm.

22. (New) The method, as recited in claim 21, further comprising maintaining the substrate at a temperature between about 10° C to about 40° C during etching of the organic dielectric layer.

23. (New) The method, as recited in claim 22, further comprising providing a power input of between about 250 W to about 1000 W.

24. (New) A method of etching an organic dielectric layer disposed below a hardmask layer and over a substrate, comprising:

placing the substrate in an etching chamber;

providing an etchant gas comprising NH3 into the etching chamber with a flow rate from about 300 sccm to about 800 sccm;

generating a plasma from the NH3, which etches the organic dielectric layer; and

maintaining the substrate at a temperature between about 10° C to about 40° C during the etching of the organic dielectric layer.

REMARKS

Claims 1-3, 12 and 17-19 have been cancelled. Claims 4 and 13 have been rewritten as independent claims, having the limitations of the claims on which they depended. Claims 20-24 have been added.

The applicant affirms the election of Group I, claims 1-16.

The Examiner objected to the specification. The specification has been amended accordingly.

The Examiner rejected claims 1-4, 12, 13, and 16 under 35 U.S.C. 102, as being anticipated by Ye et al. (US Patent No. 6,080,529).

Claims 1-3, 12 and 16 have been cancelled. Claims 4 and 13 have been rewritten as independent claims, having the limitations of the claims on which it depended. Claims 4 and 13 specifically recite placing a patterned photoresist layer over the hard mask layer and simultaneously stripping the photoresist layer during the etching of the organic dielectric layer. The Examiner failed to point out anything in Ye that discloses simultaneously stripping the photoresist layer during the etching of the organic dielectric layer. The Examiner stated that col. 22, lines 38-42, of Ye the NH3 plasma etches the organic layer and removes/strips the photoresist layer. The applicants did not see anything in this cited passage that discloses the simultaneous etching of the organic layer and stripping of photoresist. The cited passage discusses dry cleaning the processing chamber subsequent to etching and then in the next paragraph discusses etching a low k dielectric layer. For at least these reasons, claims 4 and 13 are not anticipated by Ye.

The Examiner rejected claims 5-7, and 14-15 under 35 U.S.C. 103(a), as being unpatentable over by Ye et al. (US Patent No. 6,080,529) in view of Ding et al. (US 5,814,563). The Examiner further rejected claims 8-10 and 11 under 35 U.S.C. 103(a), as being unpatentable over by Ye et al. (US Patent No. 6,080,529) in view of Ding et al. (US 5,814,563) and further in view of Ikegami (US 6,355,572).

Claims 5-11 and 14-15 each depend either directly or indirectly from the independent claims, and are therefore respectfully submitted to be patentable over the art of record for at least the reasons set forth above with respect to independent claims. Additionally, these dependent claims require additional elements that when taken in the context of the claimed invention, further patentably distinguish the art of record.

For example, claim 5 further recites providing CH3F while providing the etchant gas comprising NH3. The Examiner cites col. 10, lines 26-27, of Ding as teaching this. Col. 10,

lines 20-27, of Ding states that this etchant combination is for etching silicon dioxide. Col. 21, lines 43-45, of Ye states that the hardmask disclosed in Ye is silicon oxide. So it would not be obvious to combine the etch chemistry of Ding with the process of Ye to selectively etch an organic dielectric layer with respect to a hardmask, since Ding teaches that such a chemistry etches the hardmask of Ye and fails to teach that such a chemistry etches the organic dielectric layer. Therefore these cited references in combination do not provide a fast etch of the organic dielectric layer that has a high selectivity with respect to the hardmask layer. In addition, claims 7-10 recite a further etch process that makes the etching a two-step process. Such a two-step process of the recited etchants is not made obvious by the cited references. For at least these reasons, claims 5-11 and 14-15 are not made obvious by Ye in view of Ding, in view of Ikegami.

New claims 20-24 have been added. These claims recite specific NH3 flow rates, power inputs, and wafer temperatures.

Page 14, lines 1 to 15, of the application states that one advantage provided by the invention is the extraordinary degree of control of profile. A second advantage provided by the invention is the simultaneous stripping of the photoresist and etching of the organic dielectric layer. Another advantage is the lack of bowing produced by the NH3. The cited references do not state that they provide all of these advantages.

Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at telephone number (831) 655-2300.

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP

Michael Lee
Registration No. 31,846

P.O. Box 778
Berkeley, CA 94704-0778
(831) 655-2300